New species of deep-water Cancellariidae (Gastropoda) from the southwestern Pacific

Philippe Bouchet
Museum National d'Histoire Naturelle
55 rue Buffon,
75005 Paris
FRANCE
pbouchet@cimrs1.mnhn.fr

Richard Petit
P.O. Box 30
North Myrtle Beach, SC 29597 USA
r.e.petit@att.net

ABSTRACT

One new genus and nine new species of Cancellariidae are described from New Caledonia from depths between 200 and 600 meters. They are: *Africotriton adelphum* new species, *Mirandaphera* new genus, *Mirandaphera cayrei* new species, *Mirandaphera maestratii* new species, *Merica marisca* new species, *Sveltia rocroii* new species, *Sveltia splendidula* new species, *Nipponaphera pardalis* new species, *Nipponaphera symphoria* new species, and *Nipponaphera goniata* new species. *Africotriton adelphum* new species is the first species in that genus known from outside South Africa and Australia. The new genus *Mirandaphera* is characterized by its broad, non-umbilicate shell with very large crenulated axial ribs, and axial columella. The genus is composed of the new species described herein, *Mirandaphera maestratii* new species and *M. cayrei* new species, and two other species: *M. tosaensis* (Habe, 1961) **new combination** and *M. arafurensis* (Verhecken, 1997) **new combination,** from deep water off Japan and the Arafura Sea respectively. *Trigonaphera teramachii* Habe, 1961 and *Agatrix nodosivaricosa* Petuch, 1979 are transferred to *Nipponaphera*. New species of *Merica*, *Sveltia*, and *Nipponaphera* are the deepest dwelling known representatives in their respective genera.

INTRODUCTION

The tropical deep-water fauna of the southwestern Pacific was virtually unknown just two decades ago, but considerable advances have since been made both in terms of sampling in the field and taxonomical descriptions of the material collected. Emphasis has been placed on the exploration of the area around New Caledonia, resulting in the description of several hundred new molluscan species (see, among others, Crosnier and Bouchet, 1991; Bouchet, 1995; Bouchet and Marshall, 2001). Although the inventory is still far from complete, it has already been revealed to be one of the most—if not the most—diverse anywhere in the world, with an exceptional diversification in such families as Seguenziidae (55 species: Marshall, 1991), Muricidae (190–200 species: Houart, 2001), or Scaphopoda (73 species: Scarabino, 1995).

Based on the literature, the family Cancellariidae appears poorly represented in the tropical South Pacific, with half a dozen nominal species recorded from shallow water in New Caledonia, to just two reported from Fiji and a single species from the Society Islands. By contrast, the material originating from the recent expeditions in New Caledonia, Vanuatu, Fiji, Tonga, and Wallis and Futuna contains about 50 species of Cancellariidae, about 40 of which are undescribed, mainly from depths between 200 and 600 meters. The purpose of the present paper is to provide descriptions of the more spectacular of the new species. A more comprehensive monograph, describing and illustrating the entire cancellariid fauna of the region, will follow. We restrict ourselves in the present paper to the description of shell morphology, and defer to the second article descriptions of radulae (when available) and discussion of patterns of bathymetrical and geographical distributions.

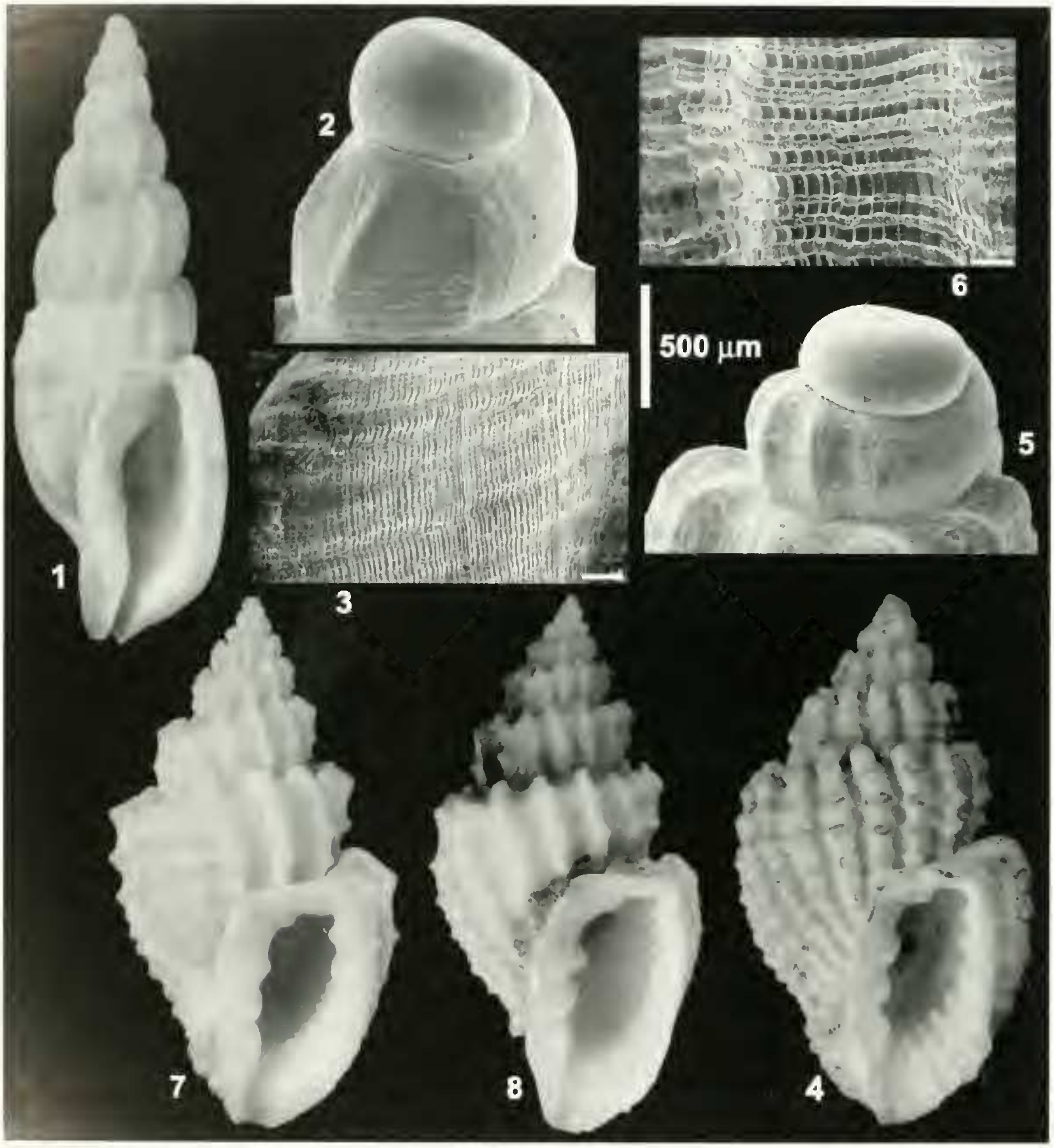
MATERIALS AND TEXT CONVENTIONS

The new species originate from several dredging programs conducted under Dr. Bertrand Richer de Forges of Institut de Recherche pour le Développement (IRD, formerly ORSTOM), Nouméa. The context of the programs, narratives of the expeditions and full station lists are presented by Richer de Forges (1990: MUSORSTOM 4), Richer de Forges (1991: Programme LAGON), Richer de Forges (1993: SMIB 5), and Richer de Forges and Chevillon (1996: SMIB 8, BATHUS 2, 3, and 4).

In the lists of type and other material examined, individual lots in MNHN are unambiguously designated by the combination of cruise acronym and station number. DW refers to dredge hauls, CP to beam trawls, lv refers to live-taken specimens, dd to empty shells, spm to commercially obtained specimens, state when dredged not known.

SYSTEMATICS

Family Cancellariidae Forbes and Hanley, 1851
Subfamily Plesiotritoninae Beu and Maxwell, 1987
Genus *Africotriton* Beu and Maxwell, 1987



Figures 1–8. New deep-water Cancellariidae. **1–3.** *Africotriton adelphum* new species. **1.** Holotype, height 22.4 mm; south of New Caledonia, SW of Île des Pins, 22°47′ S, 167°22′ E, 390 m. **2.** Protoconch of specimen from SW of Île des Pins, 22°48′ S, 167°16′ E, 444–445 m [BATHUS 2: sta. DW719]. **3.** Teleoconch microsculpture, same specimen as Figure 2. **4–6.** *Mirandaphera maestratii* new species. **4.** Holotype, height 14.0 mm; off northeastern coast of New Caledonia, Passe de Hienghène, 20°33′ S, 164°57′ E, [illegible]–610 m. **5.** Protoconch of specimen from Wallis and Futuna, 13°19′ S, 176°17′ W, 350 m [MUSORSTOM 7: sta. DW601]. **6.** Teleoconch microsculpture, same specimen as Figure 5. **7–8.** *Mirandaphera cayrei* new species. **7.** Specimen, height 27.3 mm; [illegible] New Caledonia, 19°01′ S, 163°15′ E, 311–351 m [BATHUS 4: sta. DW902]. **8.** Holotype, height 38.7 mm; South of New Caledonia, off Passe de Konaré, 22°49′ S, 166°45′ E, 300–370 m. Scale lines = 100 µm (3, 6) and 500 µm (2, 5).

Type Species: *[illegible] crebriliratus* G. B. Sowerby III, 1903, by original designation.

Africotriton adelphum new species
(Figures 1–3)

Type Material: Holotype (22.4 mm height × 7.8 mm width; lv; Figure 1) and 3 paratypes (dd), all from the type locality, in MNHN.

Type Locality: South of New Caledonia, SW of Île des Pins, 22°47′ S, 167°22′ E, 390 m [MUSORSTOM 4: sta. DW226].

Other Material Examined: South of New Caledonia. BIOCAL: sta. DW44, 22°47′ S, 167°14′ E, 440–450 m, 2 juv. lv, 1 juv. dd.—SMIB 2: sta. DW1, 22°53′ S, 167°13′ E, 438–444 m, 1 juv. lv.—SMIB 3: sta. DW26,

22°55′ S, 167°16′ E, 450 m, 4 lv.—BATHUS 2: sta. DW719, 22°48′ S, 167°16′ E, 444–445 m, 4 lv (Figures 2, 3).

Description: Protoconch mammilate, paucispiral, of 1.1 whorls, diameter 1.25–1.30 mm (Figure 2). Transition to teleoconch marked by onset of closely spaced spiral cords. Teleoconch of seven moderately rounded whorls; spire angle 26°–27°. Prominent orthocline rounded varices that extend above the appressed suture are formed irregularly, but usually at about 240° intervals. Spiral sculpture of over 60 low closely spaced spiral cords. Axial sculpture of widely spaced, rounded noncollabral ribs, 7 between final two varices, with closely packed microscopic growth lines (Figure 3). Aperture narrowly ovate. Outer lip with weak crenulations on edge but smooth within. A shield-like callus produced on the inner lip, weak over the parietal area but well produced over the inductural area and extending over the siphonal constriction. Columella almost axial with a narrow fold at the center. A second, very weak fold posterior to the center fold is visible on some specimens. Siphonal canal narrow, open, strongly recurved. Shell color cream to yellow-brown with 6 or 7 red-brown spiral bands, narrow on small shells but wide on some adults, appearing as weak bands except on the tops of the varices where they appear as narrow stripes.

Etymology: The Greek *adelphos*, brother, utilized to highlight the resemblance of the species to others in the genus; treated here as a Latin adjective.

Remarks: Of the six species included in this genus when introduced, five are from South Africa and the sixth, *A. carinapex* Beu and Maxwell, 1987, is from off New South Wales, Australia. The new species differs from *A. carinapex* in being much more slender with less convex whorls, and in having stronger spiral cords and weaker axial ribs. *Africotriton adelphum* resembles more the South African *A. kilburni* Beu and Maxwell, 1987, but that species has more prominent spiral cords and weaker axial ribs.

Subfamily Cancellariinae Forbes and Hanley, 1851
Genus *Mirandaphera* new genus

Type Species: *Mirandaphera cayrei* new species

Description: Shell relatively large, reaching over 35 mm. Teleoconch of 7–9 whorls. Shell somewhat attenuated with large axial ribs that dominate the shell sculpture. Ribs angled or rounded at the shoulder over which they project as small coronations but rarely extend back to the suture. Sutural ramp depressed. The suture is only slightly impressed. Small nodes are formed where weak spiral cords cross ribs. Spiral cords are much stronger and more evident on the ribs than in the interspaces. Outer lip thick, slightly flared on outer edge and extending back over the parietal wall as a rounded shield that extends out at the inductural area. No stromboid notch visible on outer lip. Columella axial with two strong folds and a third fold which sits on the edge of the siphonal fold before turning away to parallel other folds. Folds do not extend out to the edge of the inductural shelf. Umbilicus absent.

Discussion: Besides the two new species described here, we include *Trigonaphera tosacusis* Habe, 1961 (recently placed in *Solatia* by Hasegawa, 2001: 583) and *Solatia arafurensis* Verhecken, 1997 in *Mirandaphera*. The resemblance of these taxa to *Solatia* is only very superficial. The type species of *Solatia*, *S. piscatoria* (Gmelin, 1791), has weak columellar folds, an appressed suture, and a flaring aperture among other differences. Species of *Mirandaphera* have a superficial resemblance only to high-spired species of *Scalptia* Jousseaume, 1887 from which they differ in having an elongated tabulate shell with very large crenulated axial ribs and a axial columella. *Mirandaphera*, as understood here, is a deep-water genus. No fossil species have been recognized in the literature.

Etymology: The Latin *mirandus*, meaning wonderful or strange, combined with *aphera*. *Aphera* was introduced as a genus in Cancellariidae and later used as a stem name for various cancellariid genera, all treated as feminine. A search for its origin reveals only a few usages, the earliest of which are as the given name of women in England in the mid-17th Century.

Mirandaphera cayrei new species
(Figures 7–8)

Type Material: Holotype (38.7 mm height × 19.3 mm width) (lv) in MNHN (Figure 8).

Type Locality: South of New Caledonia, off Passe de Kouaré, 22°49′ S, 166°45′ E, 300–370 m [BATHUS 2: sta. DW731].

Other Material Examined: North of New Caledonia, BATHUS 4: sta. DW902, 19°01′ S, 163°15′ E, 341–351 m, 2 dd (Figure 7).—From commercial sources, boat Tui II, off Bélep Islands, 3 spms.

Description: Protoconch smooth, of 1.3 whorls, diameter 850 µm. Transition to teleoconch marked by strong axial rib. Teleoconch of about 9 elongate whorls. Axial sculpture of strong rounded ribs, about 12 on body whorl and 14 on penultimate whorl. The ribs are biangular on the shoulder over which they recurve and extend partially onto the otherwise smooth, flat sutural ramp. Suture barely impressed. Spiral sculpture of about 8 primary cords that form prominent nodes where they cross the axial ribs. Nodes strongest on the shoulder, wide, biangular. About 4 primary spiral cords visible on penultimate whorl. Numerous fine secondary spiral cords cover the shell, 8 or more between each pair of primary cords with an occasional secondary spiral cord intermediate in strength, not intersected by axial riblets. Ribs on adult shells sometimes formed as thickened varices with subsequent growth originating from under the

outer lip. Aperture elongate. Outer lip thick, smooth, with a narrow, smooth shelf inside the lip. About 12 strong lirae extend from lip only a short way into the aperture. A posterior canal is formed under the shoulder and is further delineated by a pustule on the parietal wall. Shield-like parietal callus well-developed. Columella with three strong folds, the anterior one weakest and bordering the distinct siphonal fold before turning to parallel the other folds. Folds do not extend to the end of the inductural callus. Body whorl only slightly constricted behind the siphonal fasciole. Umbilicus absent. Shell color off-white or beige; primary spiral cords slightly darker, light yellow-brown.

Etymology: Named for Dr. Patrice Cayré, head of IRD's Department des Ressources Vivantes, in recognition for his support to taxonomy and biodiversity exploration.

Remarks: *Mirandaphera cayrei* differs from *M. tosaensis* (Habe, 1961) and *M. arafurensis* (Verhecken, 1997) in having strong lirae within the aperture and a more turreted, attenuate shell on which the spiral sculpture is prominent in profile. *Mirandaphera maestratii* has, among other differences, more numerous axial ribs, stronger spiral sculpture, and a more rounded profile.

Mirandaphera maestratii new species
(Figures 4–6)

Type Material: Holotype (14.0 mm height × 8.4 mm width) (dd) in MNHN (Figure 4).

Type Locality: Off northeast coast of New Caledonia, Passe de Hienghène, 20°33′ S, 164°57′ E, 533–610 m [BATHUS 4: sta. DW948].

Other Material Examined: Vanuatu: MUSORSTOM 8: sta. DW1061, 16°15′ S, 167°20′ E, 458–512 m, 1 dd; Fiji: MUSORSTOM 10: sta. CP1341, 16°52.5′ S, 177°43.7′ E, 500–614 m, 1 dd; Wallis and Futuna: MUSORSTOM 7: sta. DW601, 13°19′ S, 176°17′ W, 350 m, 1 dd (Figures 5, 6).

Description: Protoconch prominent, of 1.3 whorls, diameter 850 µm (Figure 5). Onset of teleoconch marked by a strong axial rib. Teleoconch of about 6 whorls ornamented with high narrow axial ribs barely wider than interspaces. The axial ribs, 14–16 in number, extend over the rounded shoulder and turn down to a narrow sutural ramp but do not extend all the way to the moderately impressed suture. Spiral sculpture of narrow densely packed spiral cords that become denser and increase in height at regular intervals, forming bead-like nodes on the ribs. There are 8–10 nodes on the body whorl ribs with approximately 16 cords between centers of nodes. Spiral cords intersected by finer incremental riblets that form an intricately lace-like microsculpture (Figure 6). Final rib is produced as a terminal varix. Aperture elongate, narrow. Outer lip thickened with 8 lirae within that extend to the outer edge but do not descend deeply into the aperture. Posterior canal is formed under the shoulder and is further delineated by a pustule on the parietal wall. Parietal callus well-developed but not extending out as a shield. Columella with three strong folds, the anterior one weakest and bordering the siphonal fold before turning to parallel the other folds. Folds do not extend to the outer edge of the inductura. Body whorl slightly constricted behind the small but well-defined siphonal fasciole. Umbilicus absent. Shell color light brownish-yellow.

Etymology: Named for Philippe Maestrati, MNHN museum technician, in appreciation for his dedication to processing and sorting much of the New Caledonia material.

Remarks: *Mirandaphera maestratii* is separable from *M. cayrei* by its closely spaced axial ribs. The spiral cords of *M. maestratii* are also unique, being so closely spaced that the interspaces appear as incised lines. The delicate pattern they form is especially noticeable when there is a varix on which they are visible.

Genus *Merica* H. and A. Adams, 1854

Type species: *Cancellaria melanostoma* Sowerby, 1849, by subsequent designation of Cossmann (1899).

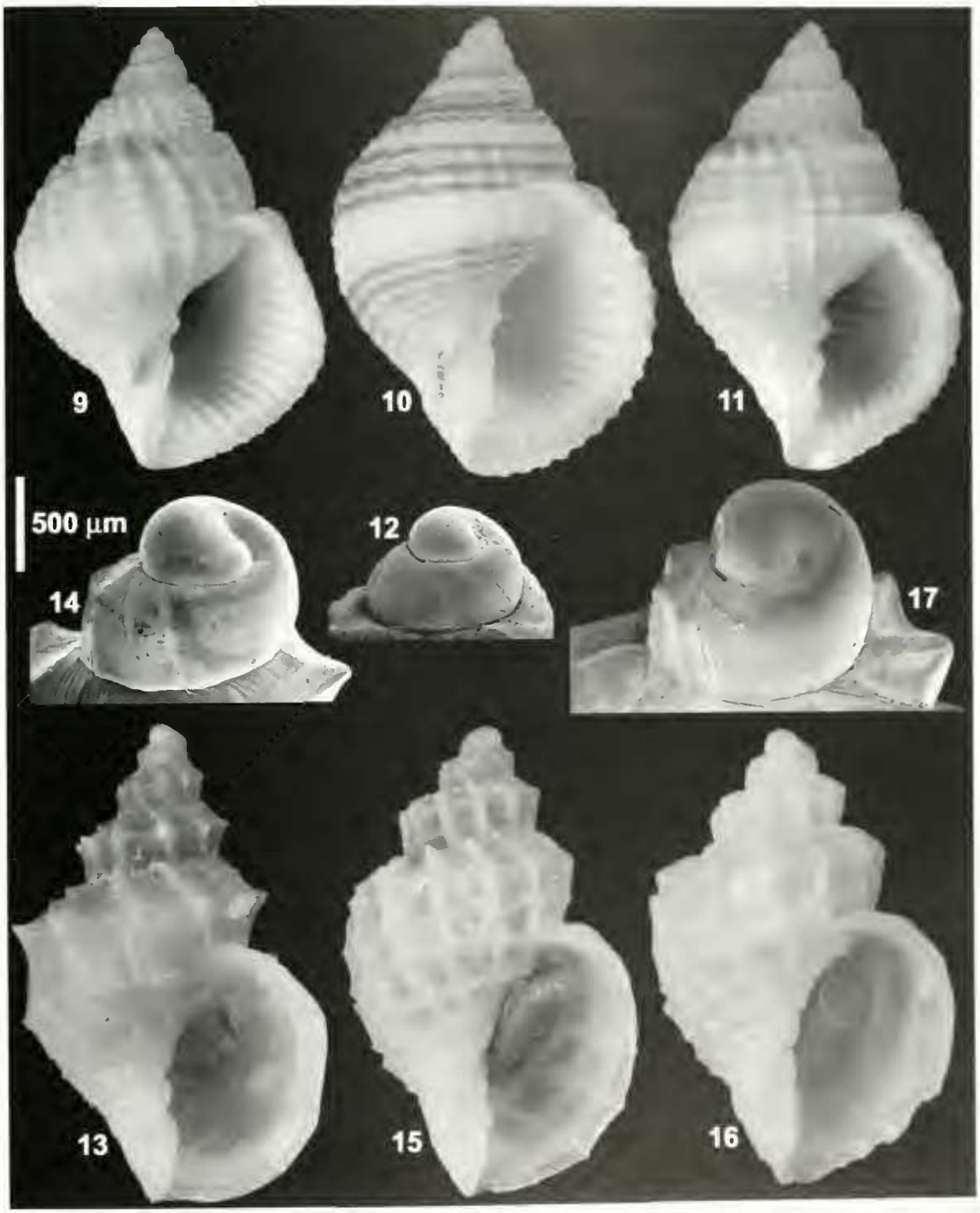
Merica marisca new species
(Figures 9–12)

Type Material: Holotype (25.7 mm height × 18.0 mm width) (lv) (Figure 9) in MNHN.

Type Locality: Off northeast coast of New Caledonia, Passe de Hienghène, 20°34′ S, 164°58′ E, 470–490 m [BATHUS 4 sta. CP947].

Other Material Examined: New Caledonia: BATHUS 4: sta. CP889, 21°01′ S, 164°27′ E, 416–433 m, 1 dd (Figure 12).—HALIPRO 1: sta. CP851, 21°43′ S, 166°37′ E, 314–364 m, 1 lv (Figure 11); Vanuatu: MUSORSTOM 8: sta. CP1136, 15°41′ S, 167°02′ E, 398–400 m, 1 dd (Figure 10).

Description: Protoconch smooth, shiny, with 1.0 whorl (Figure 12). Transition to teleoconch marked by a slight depression and onset of axial and spiral sculptures. Teleoconch of up to 6 rounded whorls. Shoulder small, rounded, sloping back to an impressed suture forming a narrow channel. Axial sculpture of about 14–16 low axial ribs on body whorl of adult; slightly more on earlier whorls. Ribs rounded in profile and narrower than intervening spaces. Periodic internal varices (see Harasewych and Petit, 1982: 111), noticeable on outer surface of shell as thickened axial ribs, each followed by a relatively flat area. Spiral sculpture of strong, broad cords (16–20 on body whorl, 6–7 on penultimate whorl); those on shoulder crowded, others usually with a secondary cord in the interspaces and rarely a tertiary cord. Aperture large with a widely elliptical, prosocline outer



Figures 9–17. New deep-water Cancellariidae. **9–12.** *Merica marisca* new species. **9.** Holotype, height 25.7 mm, off northeastern coast of New Caledonia, Passe de Hienghène, 20°34′ S, 164°58′ E, 470–490 m. **10.** Specimen from Vanuatu, height = 17.9 mm, 15°41′ S, 167°02′ E, 398–400 m (MUSORSTOM 8; sta. CP1136). **11.** Specimen from New Caledonia, height 18.7 mm, 21°43′ S, 166°37′ E, 314–364 m (HALIPRO 1; sta. CP851). **12.** Protoconch of specimen from off the western coast of New Caledonia, 21°01′ S, 164°27′ E, 416–433 m (BATHUS 4; sta. CP889). **13–14.** *Sveltia tocrou* new species. **13.** Holotype, height 14.3 mm, south of New Caledonia, Norfolk Ridge, Banc Junecan Ouest, 23°20′ S, 168°01′ E, 361–365 m (BATHUS 3; sta. DW830). **14.** Protoconch of specimen from south of New Caledonia, SW of Ile des Pins, 23°00′ S, 167°16′ E, 350 m (BIOCAL; sta. DW57). **15–17.** *Sveltia splendidula* new species. **15.** Holotype, height 11.0 mm, south of New Caledonia, SW of Ile des Pins, 22°50′ S, 167°21′ E, 500–504 m (SMIB 5; sta. DW201). **16.** Paratype, height 10.1 mm, south of New Caledonia, SW of Ile des Pins, 22°59′–23°00′ S, 167°21′–167°23′ E, 491–538 m (SMIB 5; sta. DW193–196). **17.** Protoconch, specimen from same locality as Figure 16. Scale line = 500 µm (12, 14, 17).

lip. Outer lip with a finely serrated edge; inner surface with 11 spiral lirae that diminish about a quarter whorl into the aperture. Columella with 3 folds, the posterior one being slightly larger and the anterior one forming the edge of the short, narrow canal. The anterior fold extends to the edge of the inductural callus with smaller fold-like features or pustules sometimes present on outer edge of inductura. Color yellow-brown with a dark red-brown band at shoulder and smaller lines or bands on body whorl. A white band is sometimes present just anterior to the shoulder and just anterior to the periphery.

Etymology: Latin *marisca*, f., a large type of fig.

Remarks: *Merica pirum* has many features in common with the Philippine *Merica cktyphos* Petit and Harasewych, 2000, which has stronger sculpture with heavy nodes formed at intersections of spiral cords and axial ribs. In addition, *M. cktyphos* has a rounded and more solid shell, and the protoconch is ¼ whorl larger than in *M. pirum*. Species of *Merica* live subtidally and on the continental shelf. The bathyal *M. pirum* is apparently the deepest living species in the genus.

Genus *Sveltia* Jousseaume, 1887

Type Species: "*Sveltia varicosa* [sic] Brocc." [= *Voluta varricosa* Brocchi, 1814], by original designation.

Sveltia rocroii new species
(Figures 13–14)

Type Material: Holotype (14.3 mm height × 8.9 mm width) (lv) (Figure 13) and one paratype (dd) from the type locality in MNHN.

Type Locality: South of New Caledonia, Norfolk Ridge, Banc Jumeau Ouest,. 23°20′ S, 168°01′ E, 361–365 m [BATHUS 3: sta. DW830].

Other Material Examined: New Caledonia: BIOCAL: sta. DW37, 23°00′ S, 167°16′ E, 350 m, 1 juv. lv. (Figure 14), 1 juv. dd.—MUSORSTOM 4: sta. DW181, 18°57′ S, 163°22′ E, 350 m, 1 dd.—BATHUS 4: sta. DW931, 18°55′ S, 163°24′ E, 360–377 m, 1 dd.—From commercial sources, boat Tui II, off Belép Islands, 3 spms.

Description: Protoconch smooth, erect, of 1.0 whorl, diameter 1.30 mm, axis of protoconch tilted to teleoconch (Figure 14). Transition to teleoconch clearly marked by [illegible] axis like line, angled at the shoulder and follows [illegible] of axial ribs. Teleoconch of about five whorls. Axial sculpture of low, widely spaced ribs, seven on body whorl and ten on penultimate whorl, extending from the suture to the base of the shell. Spiral sculpture of one cord situated midway on whorl and forming an angled shoulder with sharp short spines present at intersections with axial ribs. A weaker spiral cord is sometimes present between the shoulder and the slightly impressed suture. About five weak spiral cords are located anterior to the shoulder, the first anterior one widely spaced from shoulder and forming a slight angle to the body whorl. Remaining spiral cords weaker and more closely spaced. Aperture large, oval. Outer lip prosocline, formed by a terminal varix, smooth within. Parietal wall with weak callus, becoming stronger and slightly reflected at the inductura. Columella with three strong folds, the anterior one forming the edge of the short siphonal canal. Shell thin, white, translucent.

Etymology: Named for M. Jean-Paul Rocroi, MNHN, in appreciation of his contribution to mollusean nomenclature.

Remarks: The new species may be compared to only one Recent species other than *Sveltia splendidula*, described herein, is *S. gladiator* (Petit, 1976), which occurs off the Galapagos Islands at a depth of 200 m. Although their protoconchs are entirely different (the protoconch of *S. gladiator* is multispiral indicating planktotrophic larval development), the two species share the "window-like" sculpture below the shoulder formed by the widely spaced cords and ribs. The spines on the shoulder of *S. rocroii* are much shorter than in *S. gladiator*. The European Tertiary species *Calcarata calcarata* (Brocchi, 1814) is startlingly like *S. rocroii* in appearance but that species differs, among other features, in being slightly umbilicate.

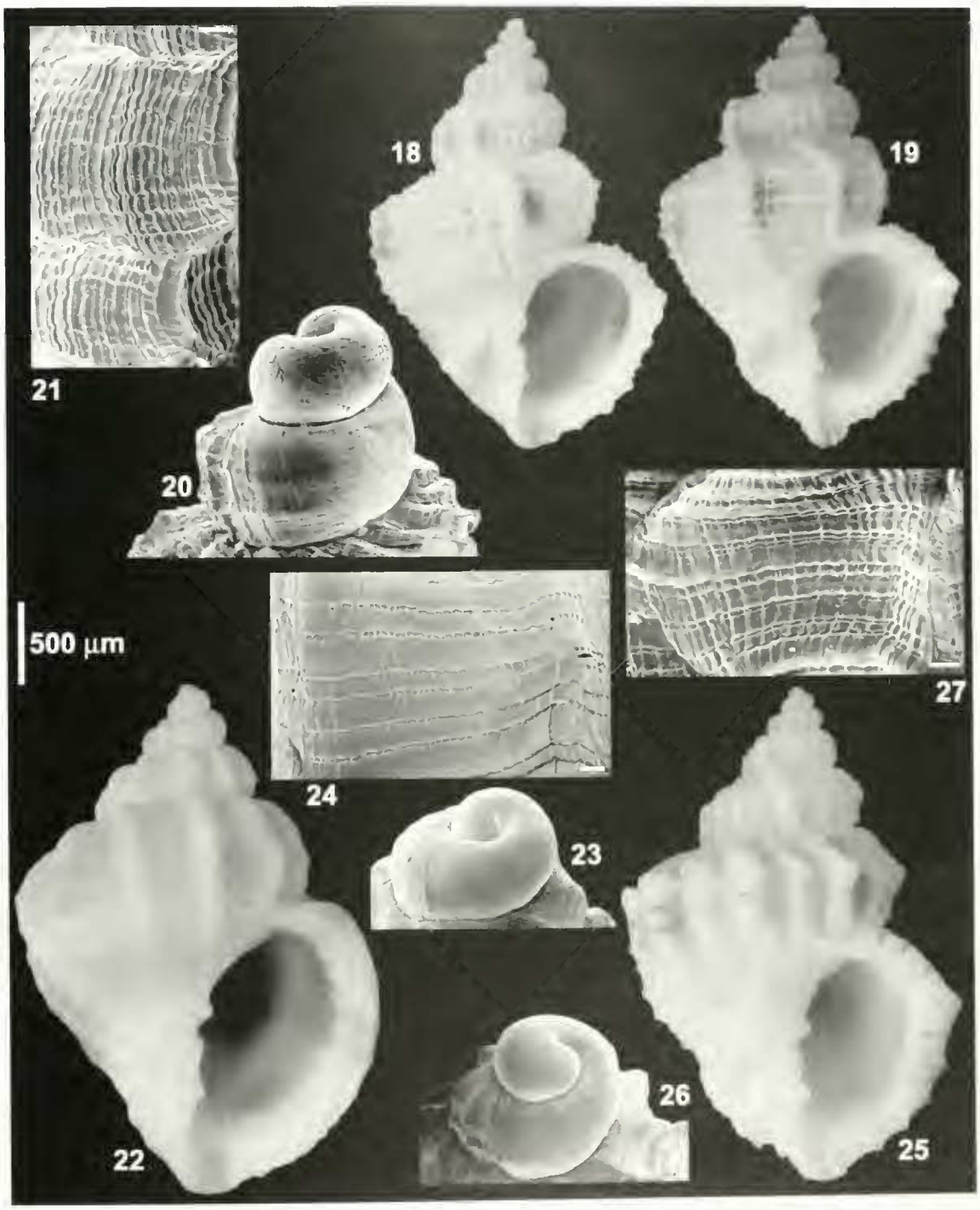
Sveltia splendidula new species
(Figures 15–17)

Type Material: Holotype (11.0 mm height × 6.9 mm width) (lv) (Figure 15) and three paratypes (1 lv, 2 dd) in MNHN.

Type Locality: South of New Caledonia, SW of Ile des Pins, 22°50′ S, 167°21′ E, 500–504 m [SMIB 8: sta. DW201].

Other Material Examined: South of New Caledonia, SW of Ile des Pins: SMIB 8: sta. DW193–196, 22°59′–23°00′ S, 167°21′–167°23′ E, 491–558 m, 1 lv, 2 dd (paratypes; Figures 16, 17).

Description: Protoconch smooth, erect, of 0.9 whorls, diameter 1.20 mm, axis of protoconch tilted to teleoconch (Figure 17). Transition to teleoconch marked by the appearance of an axial rib with angled shoulder. Teleoconch of 3+ rapidly expanding whorls. Axial sculpture of evenly spaced sharp ribs, about 12 on body whorl that are continuous from the suture to the base. The ribs are produced slightly above and over subsequent growth. Spiral sculpture of about seven sharp spiral cords. One cord, somewhat stronger, forms the shoulder over which the axial ribs cross and angle back to a slightly impressed suture. A second strong cord sometimes present at line of sutural attachment. On the final portion of the body whorl the angled shoulder becomes obsolete and the ribs curve smoothly back to an impressed



Figures 18–27. New deep-water Cancellariidae. **18–21.** *Nipponaphera pardalis* new species. **18.** Paratype, height 20.0 mm, north of New Caledonia, Grand Passage, 19°06′ S, 163°29′ E, 230 m (MUSORSTOM 4, sta. DW185). **19.** Holotype, height 25.5 mm; north of New Caledonia, Grand Passage, 19°07′ S, 163°30′ E, 220 m (LAGON, sta. LI48). **20.** Protoconch, specimen from South of New Caledonia, Norfolk Ridge, 23°18′ S, 168°05′ E, 311–330 m (SMIB 8, sta. DW181). **21.** Microsculpture of teleoconch, same specimen as Figure 20. **22–24.** *Nipponaphera cyphona* new species. **22.** Holotype, height 13.1 mm, north of New Caledonia, Grand Passage, 18°55′ S, 163°24′ E, 350–365 m (HALIA ML 1, sta. DW04). **23.** Protoconch; same specimen as Figure 22. **24.** Microsculpture of teleoconch; same specimen as Figure 22. **25–27.** *Nipponaphera goniata* new species. **25.** Holotype, height 16.1 mm; south of New Caledonia, Norfolk Ridge, Banc Azteque, 23°41′ S, 168°01′ E, 280 m (SMIB 5, sta. DW76). **26.** Protoconch, specimen from South of New Caledonia, Norfolk Ridge, 24°46′ S, 168°08′ E, 241–245 m (SMIB 8, sta. DW159). **27.** Microsculpture of teleoconch; specimen from south of New Caledonia, Norfolk Ridge, 24°46′ S, 168°08′ E, 235–252 m (SMIB 8; sta. DW154). Scale lines = 100 µm (21, 24, 27) and 500 µm (20, 23, 26).

suture. The spiral cords do not cross over the axial ribs. Aperture large, ovate. Outer lip prosocline, thin, without internal lirations. Parietal area without callus. A small callus is sometimes formed at very base of inductura. Columella with three folds, the posterior one larger and descending. The two anterior folds situated at ends of a shelf-like structure bordering the short siphonal canal. Body whorl slightly constricted behind the weak siphonal fasciole. Shell color white, translucent.

Etymology: Diminutive of the Latin adjective *splendidus* (*-a, -um*), meaning showy or magnificent.

Remarks: *Sveltia splendidula* closely resembles *S. rocroii* from which it differs in possessing more numerous and stronger spiral cords and axial ribs, and in having a much less angular shoulder. The unusual combination of sculpture and translucence gives the shell a shoji-like appearance. The bathymetric distribution of the genus *Sveltia* is unclear due to the confused generic allocation of included species, but *Sveltia splendidula* is apparently the deepest dwelling species in the genus.

Genus *Nipponaphera* Habe, 1961

Type Species: *Nipponaphera habei* Petit, 1972, by ICZN Opinion 1052.

Nipponaphera pardalis new species
(Figures 18–21)

Type Material: Holotype (25.5 m height × 18.0 mm width) (lv) (Figure 19) and one paratype (lv) (Figure 18) in MNHN.

Type Locality: North of New Caledonia, Grand Passage, 19°07′ S, 163°30′ E, 220 m [LAGON: sta. 1148].

Other Material Examined: New Caledonia: MUSORSTOM 4: sta. DW185, 19°06′ S, 163°29′ E, 230 m, 1 lv (paratype, Figure 18).—Sta. DW227, 22°46′ S, 167°20′ E, 300 m, 1 dd.—SMIB 5: sta. DW72, 23°42′ S, 168°01′ E, 400 m, 1 dd [worn; allocation uncertain].—SMIB 8: sta. DW181, 23°18′ S, 168°05′ E, 311–330 m, 1 juv lv (Figures 20, 21).—Sta. DW182–184, 23°18′–23°19′ S, 168°05′ E, 305–367 m, 1 dd.—BATHUS 2: sta. DW714, 22°38′ S, 167°10′ E, 124 m, 1 dd.—BATHUS 4: sta. DW942, 19°04′ S, 163°27′ E, 264–270 m, 1 juv lv (Figure 19).—In commercial sources, boat Tui II, off Bélep Island, 2 spms.

Description: Protoconch corroded but apparently consisting of about 1.5 whorls. teleoconch of 5.2 whorls. Spire high. Sculpture of imbricated axial lamellae and raised spiral cords that cross to form squarish intervals. Aperiodical axial varices six on final whorl, five on penultimate whorl, and two on antepenultimate whorl. Spiral sculpture of about 10 spiral cords on penultimate whorl and about 20 on final whorl. Second order sculpture of incremental lines crossing spiral threads and forming finely reticulate sculpture in the squarish intervals (Figure 21). Spire whorls regularly convex, gradually becoming angular at shoulder on final two whorls. Suture deeply impressed. Body whorl only slightly constricted behind siphonal fasciole. Outer lip thin, smooth immediately within but then with about 18 lirations that extend deeply into the aperture. Inner lip reflected as a parietal shield partly extending over the umbilical area in the inductural region. Columella slightly concave with three folds, the anterior two folds close together, much like one large bifurcate fold. Deep umbilicus well developed. Siphonal canal short but distinct. Shell background color creamy-white with brownish blotches on the periphery of the whorls behind varices; primary spiral cords brown on the varices.

Etymology: The Latin *pardalis*, a female panther. To be treated as a noun in apposition. Selected because of the brown blotches behind the varices.

Remarks: The protoconch of the holotype is corroded. The protoconch of the paratype consists of 1.8 whorls, diameter 1.15 mm (Figure 20). Among the species of *Nipponaphera* known at present, this new species most resembles *N. teramachii* (Habe, 1961), **new combination,** which is more distinctly angled at the shoulder, and has coarser sculpture. (The transfer of *Trigonaphera teramachii* to *Nipponaphera* will be discussed in our later monograph.)

Nipponaphera cyphoma new species
(Figures 22–24)

Type Material: Holotype (13.1 height × 9.2 mm width) (dd) (Figures 22–24) in MNHN; 2 paratypes, Petit collection.

Type Locality: North of New Caledonia, Grand Passage, 18°55′ S, 163°24′ E, 350–365 m [HALICAL 1: sta. DW04].

Other Material Examined: From commercial sources, off Bélep Island, dredged at 400 m by boat Tui II, May 2001, 2 spms (paratypes).

Description: Protoconch glassy, white, with 0.9 whorls, diameter 0.93 mm (Figure 23). Transition to teleoconch marked by a small varix-like axial rib followed by spiral and axial sculpture. Spiral sculpture of flat cords of varying sizes. Primary cords normally separated by slightly smaller secondary cords with even smaller tertiary cords in interspaces between the primary and secondary cords. Body whorl with 10–12 primary spiral cords, about 4–5 visible on penultimate whorl. Spiral cords separated by narrow spaces that appear as incised lines instead of spaces (Figure 24). Axial sculpture of rounded ribs, about 8 in number on the body whorl and 11 on the penultimate whorl. Small nodes are present where primary spiral cords cross the axial ribs. On the terminal varix there is a strong shoulder node. Shoulder rounded back to a barely impressed suture. Body whorl rounded but somewhat constricted behind the weak si-

phonal fasciole. Outer lip thin, weakly serrate. Inner portion of outer lip with a smooth rounded shelf followed by about 14 sharp short lirations. Columella with weak callus on inductural area. Columella with three folds that do not extend to the outer edge of the inductura. Posterior fold largest. Two anterior folds situated on ends of a low shelf-like platform with the anteriormost fold becoming the edge of the short well-formed siphonal canal. Umbilicus absent. Shell color mottled white and light brown. Colors arranged in weak bands. Brown bands are located at the shoulder, just anterior to the periphery and at the base.

Etymology: The Greek *kyphoma*, meaning hump, with reference to the sturdy axial ribs of the species. To be treated as a noun in apposition.

Remarks: *Nipponaphera cyphoma* differs from *Nipponaphera nodosivaricosa* (Petuch, 1979), **new combination** (originally in *Agatrix*), in having much finer spiral sculpture, fewer and more widely spaced axial ribs, and a proportionally broader shell. (The transfer of *Agatrix nodosivaricosa* to *Nipponaphera* will be discussed in a future monograph.) The bathymetric distribution of the genus *Nipponaphera* is unclear due to confused generic allocation of described species, but *Nipponaphera cyphoma* is apparently the species with the deepest occurrence in the genus.

Nipponaphera goniata new species
(Figures 25–27)

Type Material: Holotype (16.1 mm height × 11.4 mm width) (dd) (Figure 25) in MNHN.

Type Locality: South of New Caledonia, Norfolk Ridge, Banc Aztèque [also called Banc Antigonia on marine charts], 23°41′ S, 168°01′ E, 280 m [SMIB 5, sta. DW76].

Other Material Examined: South of New Caledonia, Norfolk Ridge. BIOCAL: sta. DW65, 24°48′ S, 168°09′ E, 245–275 m, 1 dd.—CALSUB: dive 21, 22°45′ S, 167°09′ E, 340 m, 1 lv.—CHALCAL 2: sta. DW71, 24°42′ S, 168°10′ E, 230 m, 3 dd.—SMIB 5: sta. DW154, 24°46′ S, 168°08′ E, 235–252 m, 1 dd (Figure 27).—Sta. DW157, 24°46′ S, 168°08′ E, 251–255 m, 1 dd.—Sta. DW158, 24°46′ S, 168°08′ E, 262–290 m, 1 dd.—Sta. DW159, 24°46′ S, 168°08′ E, 241–245 m, 6 dd (Figure 26).—Sta. DW173, 23°41′ S, 168°00′ E, 234–242 m, 1 dd.—Sta. DW174, 23°40′ S, 168°01′ E, 235–240 m, 2 dd.—BERYX 11: sta. DW18, 24°48′ S, 168°09′ E, 250–270 m, 1 dd.

Description: Protoconch smooth, of slightly more than 1 whorl, diameter 1.00 mm (Figure 26). Teleoconch of 3 whorls, spire high, spire angle of 63–66°. Structure of strong lamellate axial ribs reflected adapertural and much weaker uneven spiral cords. Some axial ribs are stronger than others and form stronger varices. Axial ribs number about 13 on final whorl and 14 on penultimate and antepenultimate whorls. Ribs regularly convex on first two whorls becoming distinctly angular at shoulder. Spiral sculpture of about 8 primary cords on spire whorl and about 15 on body whorl, each with 3–8 secondary cords in intervals. Spiral cords cross the many rib-like growth lines forming finely reticulate reticulate microsculpture (Figure 27). Suture well impressed. Body whorl slightly constricted behind siphonal fasciole. Aperture with about 17 lirae within that do not extend to the edge of the outer lip but extend deeply within. Inner lip forming parietal shield extending slightly over the narrow umbilicus. Columella only slightly concave with three folds, the anterior two close together, much like one large bifurcate fold. Siphonal canal short but distinct. Shell white, mottled with light brown blotches near the periphery. Primary cords brown, especially where they cross the axial ribs on the last 1.5 whorls. Some specimens are completely white.

Etymology: The Latin adjective *goniatus* (*-a, -um*), angulated, in reference to the shell outline.

Remarks: *Nipponaphera goniata* differs from *N. teramachii* (Habe, 1961) by its proportionally higher spire, narrower umbilicus, and its brown maculations. From *N. pardalis* it differs in having thicker ribs that are not imbricate. It also possesses a narrow umbilicus and has a smaller adult size. The two species, *N. pardalis* and *N. goniata*, coexist south of New Caledonia but have never been taken together.

LITERATURE CITED

Adams, H. and A. Adams. 1854 [m 1853–58]. The genera of Recent Mollusca; arranged according to their organization. 2 vols. John van Voorst, London. [1: 1–256, pls. 1–32, 1853; 1: 257–484, 2: 1–92, pls. 33–72, 1854; 2: 93–284, pls. 73–96, 1855; 2: 285–412, pls. 97–112, 1856; 2: 413–540, pls. 113–128, 1857; 2: 541–660, pls. 129–138, 1858.]

Ben, A. G. and P. A. Maxwell. 1987. A revision of the fossil and living gastropods related to *Plesiotriton* Fischer, 1884 (Family Cancellariidae, Subfamily Plesiotritoninae n. subfam.) with an Appendix: Genera of Buccinidae Pisaniinae related to *Colubraria* Schumacher, 1817. New Zealand Geological Survey Paleontological Bulletin 54: 1–140, pls. 1–30.

Bouchet, P. (ed.). 1995. Résultats des Campagnes MUSORSTOM, volume 14. Mémoires du Muséum National d'Histoire Naturelle 167: 1–654.

Bouchet, P. and B. Marshall (eds.). 2001. Tropical Deep-Sea Benthos, volume 22. Mémoires du Muséum National d'Histoire Naturelle 185: 1–406.

Brocchi, G. B. 1814. Conchiologia fossile subapennina con osservazioni geologiche sugli Apennini e sul suolo adiacente. Stamperia Reale, Milano. 2 vols. [1: 1–240, 2: 241–712, pls. 1–16.]

Crosnier, A. and P. Bouchet (eds.). 1991. Résultats des Campagnes MUSORSTOM, volume 7. Mémoires du Muséum National d'Histoire Naturelle, ser. A 150: 1–259.

Gmelin, J. F. 1791. Caroli a Linné Systema Naturae per regna tria naturae. Editio decima tertia. Vol. 1, pt. 6, Vermes: 3021–3910. Lipsiae.

Habe, T. 1961. Coloured illustrations of the shells of Japan (II). Hoikusha, Osaka. 182 pp., Appendix 42 pp., 66 pls. [An English edition was issued in 1964, with a larger page size: Shells of the western Pacific in color, Vol. II. Hoikusha, Osaka. 233 pp., 66 pls.]

Harasewych, M. G. and R. E. Petit. 1982. Notes on the morphology of *Cancellaria reticulata* (Gastropoda: Cancellariidae). The Nautilus 96: 104–113.

Hasegawa, K. 2000. Cancellarioidea, pp. 581–585, pls. 289–291. In: T. Okutani (ed.), Marine Mollusks in Japan. Tokai University Press, Tokyo. 1173 pp.

Houart, R. 2001. *Ingensia* gen. nov. and eleven new species of Muricidae (Gastropoda) from New Caledonia, Vanuatu, and Wallis and Futuna Islands. In: P. Bouchet and B. Marshall (eds), Tropical Deep-Sea Benthos, volume 22. Mémoires du Muséum National d'Histoire Naturelle, Paris 185: 243–269.

Jousseaume, F. 1887. La famille des Cancellariidae (Mollusques Gastéropodes). Le Naturaliste 9 [= ser. 2, 1]:155–157, 192–194, 213–214, 221–223.

Marshall, B. 1991. Mollusca Gastropoda: Seguenziidae from New Caledonia and the Loyalty Islands. In: A. Crosnier and P. Bouchet (eds), Résultats des Campagnes MUSORSTOM, volume 7. Mémoires du Muséum National d'Histoire Naturelle, Paris, ser. A 150: 41–109.

Petit, R. E. 1976. Notes on Cancellariidae (Mollusca: Gastropoda) - III. Tulane Studies in Geology and Paleontology 12: 33–43, pls. 1–2.

Petit, R. E. and M. G. Harasewych. 2000. Three new species of the genus *Merica* (Neogastropoda: Cancellariidae) from South Africa and the Philippines. The Nautilus 114: 142–148.

Petuch, E. 1979. Twelve new Indo-Pacific gastropods. Nemouria 23: 1–21.

Richer de Forges, B. 1990. Explorations for bathyal fauna in the New Caledonian economic zone. In: A. Crosnier (ed.), Résultats des Campagnes MUSORSTOM, volume 6. Mémoires du Muséum National d'Histoire Naturelle, ser. A 145: 9–54.

Richer de Forges, B. 1991. Les fonds meubles des lagons de Nouvelle-Calédonie: généralités et échantillonnages par dragages. Pp. 7–148, in: B. Richer de Forges (ed.), Le benthos des fonds meubles des lagons de Nouvelle-Calédonie, volume 1. Etudes et Thèses [ORSTOM, Paris].

Richer de Forges, B. 1993. Campagnes d'exploration de la faune bathyale faites depuis mai 1989 dans la zone économique de la Nouvelle-Calédonie. Listes des stations. In: A. Crosnier (ed.), Résultats des Campagnes MUSORSTOM, volume 10. Mémoires du Muséum National d'Histoire Naturelle 156: 27–32.

Richer de Forges, B. and C. Chevillon. 1996. Les campagnes d'échantillonnages du benthos bathyal en Nouvelle-Calédonie, en 1993 et 1994 (BATHUS 1 à 4, SMIB 5 et HALIPRO 1). In: A. Crosnier (ed.), Résultats des Campagnes MUSORSTOM, volume 15. Mémoires du Muséum National d'Histoire Naturelle 168: 33–53.

Scarabino, V. 1995. Scaphopoda of the tropical Pacific and Indian Oceans, with description of 3 new genera and 42 new species. In: P. Bouchet (ed.), Résultats des Campagnes MUSORSTOM, volume 14. Mémoires du Muséum National d'Histoire Naturelle 167: 189–379.

Verhecken, A. 1997. Mollusca Gastropoda: Arafura Sea Cancellaridae collected during the KARUBAR cruise. Mémoires du Muséum National d'Histoire Naturelle 172: 295–323.